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Spinning position with fiber guidance element

The invention relates to a spinning position with a fiber guidance element according to the preamble of patent claim 1.

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The present invention relates to the field of air-jet spinners. Air-jet spinners have a multiplicity of spinning positions. At every spinning position, a yarn is spun from an introduced fiber sliver. In this case, the fiber sliver is first attenuated, that is to say the amount of fiber per unit of length is reduced by drafting. Then the attenuated fiber structure is spun into a yarn at the spinning position by imparting twist. For this purpose, the spinning position has a fiber guidance element with a fiber guiding surface, which guides the fiber structure into a swirl chamber, where a yarn is produced in a spindle by the known vortex air-spinning process.

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Owing to the very high speeds of the fiber structure at the transition from the drafting system into the spindle, the aim is to design the entry into the fiber guidance element upstream of the spindle optimally. High drafting system speeds lead to strong air flows in the region of the nip line of the delivery rollers. These air flows may lead to breaking away of the fiber structure. In Figure 1 there is shown a fiber guidance element designed as a sleeve 3 with a fiber guiding surface 5 arranged inside. From the pair of delivery rollers 2 of the upstream drafting system, a fiber structure 1 is guided through the sleeve 3.

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EP 1 335 050 A2 proposes for this a sleeve in which two mutually inclined fiber guiding surfaces are arranged and, as a result, form a deflecting location inside. The deflecting location, formed as an edge, has the effect of increasing the proportion of free fiber ends on the surface of the fiber structure, by these ends lifting off. These free fiber ends are taken up by the vortex flow before the spindle. Increasing the proportion of free fibers also has the effect of increasing the proportion of wrapping fibers of the yarn and, as a result, the quality of a yarn spun in this way can be improved. Although this deflecting location improves the quality of the yarn, it does nothing to contribute to

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improving the flow conditions where the fiber structure 1 enters the sleeve 3. When the fiber structure 1 enters the fiber guidance element 3, there is in particular also the risk that the fibers lying parallel to the direction of introduction 34 will become jammed at edges that are necessarily present.

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The present invention is based on the object of providing a spinning position with a fiber guidance element and of providing a fiber guidance element with which the flow conditions even at the transition from the drafting system to the fiber guidance element are improved, in order subsequently to achieve better conditions for the spinning of the fiber structure.

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This object is achieved by the spinning position provided in patent claim 1 and by the fiber guidance element provided in patent claim 8.

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The solution according to the invention, whereby the direction of introduction of the fiber structure is inclined by an angle of inclination in relation to the direction of the fiber guiding surface at a deflecting location, for example at an entry edge, and the deflecting location is arranged inside or at the edge of the fiber guidance element;

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produces significantly improved flow conditions and, in particular, a rolling or rocking motion of the fiber structure can be effectively inhibited as a result. The deflecting location, for example an entry edge, may be arranged at the edge of the fiber guidance element, i.e. at the end face of the fiber guidance element (the end face 33 from Figure 2, described below), and by being set back or suitably positioned inside the fiber

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guidance element.

How the exit of the fiber guidance element may be designed is left open by the invention. This can take place according to the teaching of document 1 335 050 A2. However, this configuration of the exit is not prescribed as obligatory by the invention.

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Advantageous embodiments of the invention are provided in further claims.

The invention is explained in more detail below by way of example on the basis of a drawing, in which

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Figure 1 shows a representation of a fiber guidance element and a pair of delivery rollers of a spinning position according to the prior art in EP 0 854 214 A2 and EP 1 335 050 A2;

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Figure 2 shows a sectional representation of the fiber guidance element according to the invention at a spinning position;

Figure 3 shows a sectional representation that is more detailed than Figure 2 of a fiber guidance element according to the invention.

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To illustrate the stated problem and the solution provided by the present invention, a spinning position 6 of an air-jet spinner with a pair of delivery rollers 2 and a fiber guidance element 3 formed as a sleeve is shown in Figure 1 in a perspective view. A fiber structure 1 is guided through the fiber guidance element 3 and is subsequently spun into a yarn by imparting twist in the spindle 7 (not represented). The task of the fiber guidance element 3 is to introduce the fiber structure 1 optimally to the subsequent swirl chamber 36, in order that a yarn can be formed there by means of an air flow.

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In the following context, the terms fiber guidance element 3 and sleeve 3 are used synonymously.

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A fiber guidance element 3 is shown in Figure 2. The fiber structure 1 is transported in the direction 34 to the fiber guidance element 3. In order to achieve still better splaying of the edge fibers, a deflection is provided at the entry edge 32. The entry edge 32 is formed by an inclination between the direction of introduction 34 and the fiber guiding surface 5, arranged in the sleeve 3, and is arranged inside said sleeve 3. In this exemplary embodiment, an exit edge 17 is also provided, in order to achieve additional

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splaying of the edge fibers. Provided at the end of the exit edge 17 is a twist stop 38. However, how the exit and the following introduction into the inlet mouth 9 of the spindle 7 must be designed is left open by the present invention. Arranged ahead of the inlet mouth 9 in the swirl chamber 36 is an air entry opening 37. Arranging the entry edge 32 inside the fiber guidance element 3 makes it particularly advantageous to design the entry with a run-in ramp 39 in such a way that the fiber structure 1 cannot become jammed as it enters.

Particularly advantageous dimensional specifications for the arrangement of the entry edge 32 are given below; reference is thereby made to Figures 2 and 3 simultaneously. It should be noted that, both together and on their own, these dimensional specifications make advantageous conditions possible for the entry of the fiber structure 1 into the sleeve 3:

- i) The angle of inclination α between the fiber guiding surface 5 and the direction of introduction 34 of the fiber structure 1 preferably lies in a range of values of $5^\circ \leq \alpha \leq 85^\circ$, with preference $5^\circ \leq \alpha \leq 70^\circ$, with particular preference $5^\circ \leq \alpha \leq 25^\circ$.
- ii) The direction of introduction of the fiber structure is inclined with respect to the plane of the drafting system by an angle β , which preferably lies in a range of values of $0^\circ < \beta \leq 10^\circ$.
- iii) With reference to the plane 35, which is defined by the axes of the two delivery rollers 2, the entry edge 32 is at a distance a from said plane 35 which preferably lies in a range of values of $9 \text{ mm} \leq a \leq 13 \text{ mm}$.
- iv) The entry edge 32 is arranged with respect to the usually cylindrical shape of the sleeve 3 at the distance b from the upper end face 33 of the sleeve 3. The distance b thereby preferably lies in a range of values of $0.01 \text{ mm} \leq b \leq 4 \text{ mm}$.
- v) With respect to the plane 30 of the drafting system, the entry edge 32 is at a distance c which preferably lies in a range of values of $0 \leq c \leq 3 \text{ mm}$.

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vi) The run-in ramp 39 is inclined with respect to the fiber guiding surface 5 by an angle γ . The range of values preferably lies in a range of values of $100^\circ \leq \gamma \leq 150^\circ$.

5 As explained above, the values specified can be used both individually for the spinning position 6 or for the fiber guidance element 3 and in combination. How the fiber guidance element 3 is to be structurally designed is left open by the invention, for example a rounding may be performed at the entry edge 32.

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List of the reference numerals and abbreviations used

- 1 fiber structure
- 2 pair of delivery rollers
- 3 fiber guidance element
- 5 4 fiber guiding channel
- 5 fiber guiding surface
- 6 spinning position
- 7 spindle
- 9 inlet mouth
- 10 17 deflecting location, exit edge at the fiber guiding surface of the fiber guidance element
- 30 plane of drafting system
- 31 nip line
- 32 entry edge at the fiber guiding surface 5 of the fiber guidance element 3
- 15 33 upper end face of the fiber guidance element 3
- 34 direction of introduction of the fiber structure before entry into the fiber guidance element 3
- 35 plane formed by the axes of rotation of the delivery rollers 2
- 36 swirl chamber
- 20 37 entry opening air flow
- 38 twist stop
- 39 run-in ramp
- α angle between fiber guiding surface 5 and direction of introduction 34 of the fiber structure
- 25 β angle between direction of introduction of the fiber structure and plane 30 of drafting system
- γ angle between run-in ramp 39 and fiber guiding surface 5
- a distance of entry edge 32 from plane which contains the axes of rotation of the delivery rollers 2 of the drafting system
- 30 b distance of entry edge 32 from upper end face 33 of the sleeve 3
- c distance of entry edge 32 from plane of drafting system 30